

COST AND MANAGEMENT

PROFI

PERIODICALS

**The Importance of
The Time Factor
in Investment Decisions . . .**

By C. G. Edge

The Organization Analysis . . .

By H. J. Neufeld

Business Forecasting . . .

By E. F. Stevens

LOSS

***Official Journal of
The Society of Industrial and
Cost Accountants of Canada***

June, 1956

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- devising and giving effect to better management methods, and
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Cost and Management

VOL. XXX

JUNE

No. 6

THE IMPORTANCE OF THE TIME FACTOR IN INVESTMENT DECISIONS

By C. G. EDGE 211

The author is a graduate in Economics of London University, a Fellow of the Royal Statistical Society, an Incorporated Statistician, and a Registered Industrial and Cost Accountant. Prior to and after the war he was employed on statistical, and organization and methods works in the British Civil Service. Since joining Canadian Industries Limited in 1951 he has been engaged in the financial and economic aspects of chemical operations.

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Manager of Planning of the Great-West Life Assurance Company, Mr. Neufeld has been in the life insurance business since 1937. He is a member of the Canadian Planning Committee of the Life Office Management Association, the Systems and Procedures Association of America, the Winnipeg Chapter of the National Office Management Association and a Fellow of the Life Management Institute.

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A senior partner in the management consultant firm of Urwick, Currie Limited, Mr. Stevens articulated in Chartered Accountancy in England. He came to Canada in 1949 and prior to joining his present company, was Controller of Canadian Food Products and Assistant to the Vice-President of Overseas Operations in Ford of Canada. He is a Registered Industrial Accountant.

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Published Monthly by the
SOCIETY OF INDUSTRIAL AND COST ACCOUNTANTS OF CANADA
Incorporated 1920
Editorial and Business Offices: 31 Walnut Street South, Hamilton, Ontario
J. N. Allan, R.I.A., Secretary-Manager and Editor

Subscription price to non-members, \$5.00 per year. Single copies, 50 cents.

Members desiring five copies or more of a single issue, may obtain them at 25 cents. Opinions expressed by articles and comment are not necessarily endorsed by the Society of Industrial and Cost Accountants.

Authorized as second class mail, Post Office Department, Ottawa.

Editorial Comment . . .

OPPORTUNITIES UNLIMITED

One of the most gratifying and encouraging features of accountancy these days is the increasing variety of positions available to R.I.A.'s. It should be of interest to our students to realize how broad the field has become. Finance in all aspects has become exceedingly complex and as a result much diversification of effort has taken and is taking place. The opportunities for men with a good financial background to exercise any special talents and aptitudes have greatly increased.

There are, of course, all the traditional positions available such as comptroller, treasurer, chief accountant and the assistants thereto, which carry their historic importance, prestige and earnings. But in addition some newer and most interesting positions are being created by management.

The current pointed interest in what earnings and performance will be has brought about the staff position of budget director or supervisor. This is essentially a planning job and requires initiative, imagination, intelligence and, most important, an ability to deal with people, covering as it does the functions of production, sales, and administration. For someone who enjoys the cool invigorating air of the future with a sense of economics and statistics and the intuitive skills of a diplomat, these positions are ideal. They carry influence and weight in any organization.

The cost supervisor and plant accountant titles are well established now and usually head up an interesting line job over a manufacturing division or a function. These particular spots are more in the traditional nature of accounting positions serving under the comptroller's direction with day-to-day responsibility to a divisional manager. The decentralization of accounting effort has promoted these interesting, enjoyable and well-paid positions.

Systems and procedures are much to the fore these days both to introduce order into the complications of modern administration and to effect cost reductions in clerical effort and paper work. Advertisements are occurring in increasing numbers for systems and procedures analysts with a strong cost accounting background. Naturally R.I.A.'s are preferred. For those with the special talents for order and simplicity in paper work these opportunities offer most interesting work.

These are a few of the usual and unusual positions in industry now available for our students and graduates.

Consulting agencies now employ men with accounting and cost accounting backgrounds as staff consultants. Here is a chance for those able to innovate new methods and to improve old and tired accounting, stores and planning systems.

Cost accountants are now employed in increasing numbers to assess and test the economic alternatives occurring in those service agencies

EDITORIAL COMMENT

such as railways, transport companies and steamships. Construction companies find our men invaluable in controlling costs in this rather difficult field.

All in all, it would seem that the golden age of accountancy is here and our members would do well to consider these many alternatives while studying and preparing for their future place in commercial society.

INDUSTRIAL OR COST ACCOUNTING

Definitions are always interesting to consider. Recently, one writer described cost accounting as the detailed drudgery of accounting but at the same time admitted that it presents some of the most interesting problems.

A further descriptive paragraph states that if the cost accountant is 100% successful, at the end of an accounting period the expenses apportioned to the various orders that have gone through a plant will equal the total expense actually involved.

The inference seems to be fairly obvious that cost accounting is a detail or a phase of general accounting and is thereby a secondary or even minor rank in the hierarchy of the finance function in a corporation.

It might be worth taking a few paragraphs to explain this concept in order to clear our thinking.

No one in the accounting profession would decry or diminish the importance of the contribution of the purely financial function of accountancy. The essentiality of recording assets, and liabilities, of computing depreciation, the keeping of accounts receivable and payable, collection of accounts, the preparation of government tax returns, and the supervision of audit procedures, are self-evident.

However, the modern emphasis on the income statement cannot be overlooked. Here the cost accountant makes a tremendous contribution and particularly in the development of interpretive operational statements. Standards of performance expressed in dollars are a marked guide to managers in stating not only what profit is but, more important, what it should have been. Constructive executive action becomes possible when one or more of the cost accounting techniques of standard costs, flexible budgets and marginal or direct costs are employed.

To be perfectly frank, what controls are available to operating management unless a sound cost structure exists? Certainly no budgetary control can exist, and without this essential planning device, profit projections are little better than extrapolations of historic P & L figures.

It would seem that if cost accounting can perform these services, it has more than a spot niche in the accounting structure.

It is interesting to point out the trend to decentralize accounting in Canadian industry. Many positions now exist under the heading ac-

COST AND MANAGEMENT

countant. It is even more interesting and revealing to describe the usual duties of such a position.

In most companies, he supervises the entire cost effort which includes plant budget preparation and control and the setting of standard costs. He will operate a factory ledger with detailed inventory asset accounts and all other accounts necessary to construct a gross P & L. Invoicing and certification of payables are also part of the work in such an organizational plan. In many cases office management is added to the general supervisory duties.

It is hard to imagine such work being of a routine mechanical distribution nature or the detailed drudgery of accounting.

This, it strikes us, is performing not only a highly important cost accounting function but also covers many aspects of general accounting and leads to the conclusion that industrial accountant is a better description of his job. Certainly there is no question of secondary status for men soundly trained in accounting, costs and budget principles, whether they be called cost accountant or industrial accountant.

COST ACCOUNTANT

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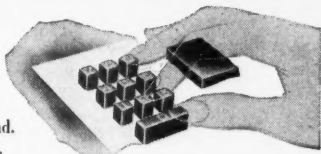
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C. & M. Round-Up . . .

LOOKING AHEAD

Thirty-five billions will be spent by U.S. business this year. It will be above the previous high in 1955 by 22%. Most of the growth will be in cement, steel, oil, power, and durable goods manufacture.

—o—o—

Life insurance coverage by 1980 will be double that of the present. Last year's average \$1,700, 1954's figure \$1,560, 1980, expected, \$3,300 - \$3,700.

—o—o—

Big T.V. Screen. British scientists have developed an almost flat 21" T.V. tube which can be hung on the wall like a movie screen. We hope it's portable.

—o—o—

Tourist Trade Up. Estimates from the U.S. show a 510 million dollar tourist budget for Americans to spend in Canada this year. This is one American investment in both money and good will to which no Canadian will object.

—o—o—

1956 general economic conditions show favourable trend. In the first quarter there has been a broad diversification in the upsurge of Canadian business, a relatively tight credit situation, and an absence of inventory expansion despite high production. All in all, it indicates an underlying strength in the Canadian economy. Much of the force in Canadian industry derives from expansion in mineral and forest products and these have figures prominently to date.

CONSTRUCTION

It grows and grows as an industry.

In 1955	Building	3.3 billion
	Engineering	2 billion
In 1980	Building	8.5 billion
	Engineering	5.5 billion

This is a tremendous increase but population will increase 15% in the next five and 80% in the next 25 years . . . Residential building will rise from 1.5 to 3.9 billion in that period . . . Gross national product reached 26.2 billion in 1955, is expected to climb 22% by 1960 and up by 167% in 1980 . . . Industrial building will rise to 1.7 billion in 1980 or 3½ times the present rate . . . Shop and office building will rise to 1.4 billion or treble the present figure.

Power construction presently at 372 million will jump by 1980 to 1.5 billion.

New roads will require an annual expenditure of 1.5 billion in 1980 compared to present 500 million.

Other engineering construction now at a little better than 1 billion will treble to 3 billion in 1980.

Incomes are rising but productivity is increasing at a greater rate. The production per worker in 1980 should be double that of today.

C. & M. ROUND-UP

STANDARD OF LIVING

We do enjoy a high standard of living. For example we spend as much on liquor, tobacco, entertainment and automobiles as we do on housing.

Food costs the most and, significant or not, reading and education the least.

Here is a breakdown of a survey made by the D.B.S. among 1000 families all across Canada with incomes ranging from \$1,800 to \$6,500 per year.

Out of every dollar they spent—

27.3 cents on food

15.6 cents on housing, fuel, light and water

9.5 cents on clothing

TOTAL on necessities—52.4 cents

Spending on some of the extras was—

7.8 cents — automobile

6.2 cents — furniture

5.8 cents — direct taxes

4.3 cents — medical care

3.6 cents — entertainment

3.5 cents — liquor and tobacco

1.1 cents — reading and education



New Air Routes. C.P.A. is considering a Toronto-Madrid service. They have recently put in a Toronto to Mexico City service. Vacationers seem to like the atmosphere, climate and scenery down there, to say nothing of the favourable exchange.

Your life expectancy is greater if you are under 50.

In the 1930's and early 1940's the death rate was 9.5 per 1,000. In 1949 it was 9.2 and in 1954 8.2.

The biggest improvement is in all age groups under 40.

The death rate over 50 has climbed in the last decade and in this age bracket —

Heart disease shows 2.8, was 2.2 per 1,000

Cancer shows 1.3, was 1.0 per 1,000

Pneumonia shows .6, was .6 per 1,000

Tuberculosis shows .1, was .29 per 1,000



How do you spend your leisure time? The average Canadian city dweller now spends 18.7 of his income in fields open to leisure goods.

6.2% on home equipment (Do It Yourself tools)

7.8% on the car or cars

3.6% on recreation (boats, games)

1.1% on reading and study

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How is your personal debt situation? Pre-war figures showed a national average on consumer debt of 9% of disposable income. That is income left over after necessities are met. It has risen to 12% of disposable income. However monthly repayments in relation to commitments on new debts are said to be considerably higher than a year ago. Are yours?

Watch your health, Mr. Businessman. More companies are becoming interested in executive health check-ups. The American Medical Association says that 55.8% of business executives are ill and don't know it. Fairly complete check-ups may be had as low as \$40 while the super de luxe, 3-days-in-hospital variety, including all known tests, could cost \$200. Many companies feel it is a good thing to sponsor such care of their executive human assets.

Ten rules for good mental health are given by the Canadian Mental Health Association as follows:

1. A tolerant, easy-going attitude toward yourself as well as others.
2. A realistic estimate of your own abilities—neither underestimating nor over-estimating.
3. Self-respect.
4. Ability to take life's disappointments in stride.
5. Ability to consider the interest of others.
6. Liking and trusting other people and expecting others to feel the same way about you.
7. Feeling part of a group and having a sense of responsibility to your neighbours and fellow men.
8. Acceptance of your responsibilities and doing something about your problems as they arise.
9. Ability to plan ahead, and setting of realistic goals for yourself.
- 10 Putting your best efforts into what you do and getting satisfaction out of doing it.

PERSONALS

A. Padmos, R.I.A. has been appointed Manager of Manufacturing Accounting of Ford Motor Co. of Canada Ltd., Toronto. He was formerly Manager of the Cost Department. Mr. Padmos is a member of the Toronto Chapter.

A. C. Lyons, formerly Office Manager of Silverwood Dairies Ltd., Chatham, has been transferred to the Brantford office of this company.

L. J. Clements, formerly of the Peterborough office of Silverwood Dairies Ltd., will succeed Mr. Lyons as Office Manager at Chatham.

H. E. Cannon, R.I.A., Second Vice-President of the Ontario Society, has been appointed Comptroller of the Ontario Division of John Labatt Limited with headquarters in London. Mr. Cannon was formerly Assistant Controller of Labatt's Toronto plant.

Books in Review . . .

ELECTRONIC DATA PROCESSING FOR BUSINESS AND INDUSTRY

By Richard G. Canning, published by John Wiley & Sons, Inc., New York, 1956, p. 298, price \$7.00.

Reviewed by VICTOR F. DAVIES, B.Com., R.I.A.

This book makes a strong plea for a properly done and timely systems engineering approach in the hope that people will be guided to the *efficient* use of electronics. It presents some very easily understood examples of what electronics can do and follows in succeeding chapters with a summary of E.D.P. machines; programming of clerical operations; the systems study; the electronic system; the role of operations research; equipment characteristics; and management's program for obtaining a reliable system.

The book is not a complicated treatise; nor was it designed to be. It has been developed from a course which the author has been presenting to classes in industrial and business management and seeks to (1) define electronic data processing, (2) what it can do for a company and (3) how a company should go about its investigation. The reader need have no previous knowledge of electronics.

The author has had considerable experience in this field and it would be well for those interested in electronics to heed his recommendations since "many firms can sign the order blanks and letters of intent for these machines — and just as easily lose their shirts thereby."

This is recommended reading for (1) those who want an idea of what electronics is about, (2) top management, (3) those engaged in a survey, and (4) the equipment manufacturers.

"Electronic data processing is a thing of the present. It deserves management's attention now." — So does the book.

GENERAL COST ACCOUNTANT

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The Importance of the Time Factor in Investment Decisions . . .

By C. G. EDGE, B.Sc. (Econ.), F.S.S., A.I.S., R.I.A.,
Supervisor, Chemicals Division-Control,
Canadian Industries Limited,
Montreal, Quebec.

Large sums of money are being spent today on new plants and replacement of assets. Where the pattern of income arising from these expenditures is not constant, it is suggested that methods currently used may not always lead to a sound evaluation of the economics of these expenditures. A method of achieving this is discussed based on taking the pattern of expenditure and income over the life of a project, assessing it in terms of the value of money at a definite point in time, and expressing the results in terms of a single figure of return on investment. The proposed method is compared with other methods of investment appraisal and its advantages indicated.

WE LIVE today in a dynamic expanding economy in which change is the key-note of progress. In order to survive in this competitive climate, companies need to re-invest in modern equipment and plants, but growth depends on the development of new products, new markets, improved packaging, better customer service, higher quality, and more efficient processes. To achieve such objectives, extensive research and development programmes are required followed by large investment outlays. Decisions made to-day on investment outlays cannot easily be reversed and they will affect the economic strength of a company for the next twenty years or longer. It is, therefore, essential that most careful estimates be made of future results from projects and that the economics of these results be correctly evaluated. In most instances, several projects are competing for company funds and management requires the best tools available for the selection of those courses of action which will yield the greatest benefit both to the company and to the economy. It is suggested that the tools currently being used for the economic evaluation of new projects and replacement of assets may not always be the sharpest and may, therefore, lead to decisions which result in less than optimum benefit to the company. It makes a considerable difference to the economics of a project whether income is obtained in an even annual stream or whether the main amount of income is likely to occur in the early or late years of its life. A method of evaluating this is proposed which, although not new, is nevertheless not yet widely known or used. It is based on taking the pattern of expenditure and income over the life of a project, assessing it in terms of the value of money at a definite point in time, and expressing the results in terms of a single figure of return on investment. The simplicity of the method also eliminates some of the complexities which are liable to intrude into the evaluation of projects by other methods. The more usual methods of assessing the return on investment relate net profit to investment either in representative years or average the return over the life of a project. Where the income pattern is reasonably constant these

COST AND MANAGEMENT

methods yield satisfactory results. However, in many projects income is not constant and, in addition, there are usually a wide range of alternative courses of action to evaluate and this can be done more effectively by the proposed method. These advantages are discussed in comparing the method with other ways of appraising projects. Although in these other methods, presentation of information to management may ignore the effect of the time factor, it may nevertheless be appraised on the basis of judgment and experience. The new method does, however, assess the time dimension on a scientific basis, simplifies the presentation of the economics of a project, and enables management to concentrate on the validity of the assumptions and estimates used. It is, therefore, suggested that improved methods of investment appraisal can make a real contribution to the economic well-being of a company.

Reasons for Investment

It is a well established rule that people tend to discount the future. In other words they are willing to borrow \$1,000 in order to have the use of that money and pay back \$1,100 at the end of the year. In the same way, companies invest money in projects in the expectation that the income resulting from that expenditure will be sufficient both to pay back the original capital and, in addition, yield a further amount for interest or return on capital. It follows, therefore, that capital or assets are valued for the income stream they will produce in the future and, hence, the main economic factors to be taken into account in appraising an investment project are the capital expenditure, and the amount and timing of the income resulting from that expenditure.

Because of the lack of certainty about the meaning attached to the words expenditure and income, it is proposed to substitute the terms "cash out-flow" and "cash in-flow". "Cash out-flow" is defined as the cash expenditure on a project whether capitalized or charged to expense and "cash in-flow" is defined as the net cash receipts in a given period and is, therefore, equivalent to the sum of net profit and depreciation. This definition highlights the fundamental nature of the reason for embarking on new projects, namely the expenditure of cash to-day in the expectation that subsequent cash receipts will exceed the cash expenditure and yield a return on that expenditure.

Method of Measuring Return on Investment

An understanding of the new method may be obtained by examining some simple relationships between expenditure, interest, and income. It has already been indicated that individuals would be prepared to invest \$1000 to-day in the expectation of obtaining \$1,100 a year hence. The same statement is equivalent to saying that the "present value" of \$1,100 one year hence is \$1,000. However, a project does not usually result in income or a cash in-flow for one year only, but a series of cash in-flows throughout the useful life of the project.

THE TIME FACTOR IN INVESTMENT DECISIONS

Let us now look at another example. Assume that a project yields a cash in-flow of \$200,000 for five years and then ceases, and that the interest rate is 10%. From interest or discount tables it can be determined that:—

\$200,000 at end of the first year is equivalent to	\$181,818 to-day
\$200,000 at end of the second year is equivalent to	165,289 to-day
\$200,000 at end of the third year is equivalent to	150,263 to-day
\$200,000 at end of the fourth year is equivalent to	136,603 to-day
\$200,000 at end of the fifth year is equivalent to	124,184 to-day
	\$758,157

Therefore an outlay or cash out-flow of \$758,157 to-day at 10% interest would yield a cash in-flow of \$200,000 a year for five years. This is equivalent to saying that a project for \$758,157 will fully recover the original capital and yield a 10% return on the outstanding capital at the end of each year.

This is illustrated in the following table.

End of Year	Capital Outstanding \$	Cash In-flow \$	Capital Repayment \$	Interest on Outstanding Capital at 10% \$
0	758,157			
1	633,973	200,000	124,184	75,816
2	497,370	200,000	136,603	63,397
3	347,107	200,000	150,263	49,737
4	181,818	200,000	165,289	34,711
5	—	200,000	181,818	18,182
		1,000,000	758,157	241,843

Basically this is identical with the mortgage payment on a home and is also, therefore, directly related to the interest rate at which funds can be borrowed.

There is also a third way of looking at the problem. Supposing a project will yield an income of \$200,000 in each of the first five years and that the rate of interest is 10%.

A company would need:—

to invest \$181,818 to yield \$200,000 in one year's time
to invest \$165,289 to yield \$200,000 in two years' time
to invest \$150,263 to yield \$200,000 in three years' time
to invest \$136,603 to yield \$200,000 in four years' time
to invest \$124,184 to yield \$200,000 in five years' time
Total \$758,157

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In other words an outlay of \$758,157 to-day will yield \$200,000 a year for five years.

Projects, however, rarely yield a constant income, but this presents no difficulty as variations in income can be allowed for in the calculation as the following example shows.

A company would need:—

to invest \$ 454,545 at 10% to yield \$500,000 in one year's time
to invest \$ 330,579 at 10% to yield \$400,000 in two years' time
to invest \$ 225,394 at 10% to yield \$300,000 in three years' time
to invest \$ 136,603 at 10% to yield \$200,000 in four years' time
to invest \$ 62,092 at 10% to yield \$100,000 in five years' time
\$1,209,213 Total Investment

It will be noticed that there are three factors in the above equations, the cash out-flow, the cash in-flow and the rate of interest. It will also be noticed that the rate of interest and cash in-flow have been given, and the cash out-flow determined. This was solely for the purpose of demonstration since in the consideration of new projects estimates are provided of the cash out-flow and cash in-flow, and it is the rate of interest or rate of return which is determined.

Definition of Method of Measuring Return on Investment

At this stage and before moving on to more complex cases it is convenient to define this method of measuring return on investment.

The theory underlying this method has been known to economists and investment analysts for many years, but the practical application has been developed more recently both by the Atlantic Refining Company and by the well-known American economist, Joel Dean. It is defined as "the method which indicates the maximum rate of interest at which funds can be borrowed to finance the project without causing it to show an ultimate loss"

or

"the method which indicates the maximum discount rate which can be applied to all future net receipts so as to make their sum equal to the initial expenditure".

This method will therefore, be referred to in future as the "discounted cash flow method" of measuring return on investment.

Further Factors To Be Taken Into Account in Appraising Investments Projects

Depreciation

Depreciation is usually defined as the recovery of the original cost over the life of the project. It is therefore, a non-cash cost and does not affect the in-flow of cash except for its effect on corporation taxes, which is discussed later. It follows, therefore, that the method of applying depreciation on the Company's books whether diminishing balance or

THE TIME FACTOR IN INVESTMENT DECISIONS

straight line can have no bearing on the appraising of an investment project. It is irrelevant to any such appraisal except for the effect on taxation and should be ignored. The fundamental feature of depreciation is that the capital should be recovered over the useful life of the asset. The method, therefore, focuses attention on estimating the useful life of the project being considered.

Corporation Taxes

In many accounting problems corporation taxes are ignored, either for the sake of simplicity or because taxation rules may distort the economic reality of a problem. In considering the method under review, corporation taxes can and should be taken into account. There is only one way they affect the appraisal of a new project and that is as a "paid-out cost". It follows, therefore, that corporation taxes should be calculated after providing for the capital cost allowance permitted under the government tax regulations.

Charges to Expense versus Capitalization

In comparing the relative attractiveness of different projects with the same total expenditure, the return on investment may be misleading if different proportions of the expenditure are capitalized. Since it makes no difference to the money paid out, whether it is capitalized or not, the distinction is irrelevant to the appraisal of projects. However, in so far as money charged to expense is a tax allowable item in the current year and the amounts capitalized are allowed as costs for taxation purposes only in future years, the effect of charging part of a project to expense or capitalizing it should be taken into account in so far as it affects the timing of taxes as a paid-out cost.

Effect of Length of Period of Construction and Preliminary Manufacturing Expenses

Although there are a few projects in which money is expended instantaneously and a project comes into operation — for example, the purchase of a going concern — there are many cases where expenditure on construction may be spread over a year or longer. In addition, very often heavy preliminary manufacturing expenses may be incurred for such things as training a staff, trial start-ups, heavy promotional expense, and the initial out-put of a plant may not be of a marketable quality. All these factors should be taken into account in appraising a project and should, therefore, be reflected in the cash flow. This can be done by converting the expenditure at the time it will be incurred to the present value at the time operations started, at the rate of return applicable to the project.

Effect of Disposal Value at the end of Project

When the operations resulting from a project are terminated, this is generally due either to obsolescence, in which case the plant is scrapped and has a salvage value or, alternatively, the plant may be sold as a going concern. In either case the money received should be included in the cash in-flow for the year concerned and discounted to its present value.

COST AND MANAGEMENT

In passing, it is of note that the value placed on the sale of an asset as a going concern would normally be equal to the sum of all future incomes discounted to present value at a realistic rate of interest and is, therefore, basically similar to the method being discussed.

Effect of Working Capital

Since money would be required for working capital it should, therefore, be shown as an out-flow of cash when it is required, and since at the end of a project the working capital will again be set free it should, therefore, be shown as a cash in-flow at that time. If working capital requirements change during the life of a project, these can also be reflected in the cash flow.

Pattern of Income or Cash In-Flow Resulting from a Project

In the method of estimating the return by relating net profit to average operating investment, one figure is usually given for a representative year. However, the profit from a plant is rarely constant during its lifetime.

Many factors affect this and some of these are:—

- i) The plant may be installed before the market has developed to a sufficient size to absorb its capacity, and earnings may, therefore, be low in early years.
- ii) Heavy promotional expense may be incurred in the early years.
- iii) Maintenance costs tend to rise in later years.
- iv) Technological advances in competitors' plants may result in a competitive disadvantage in quality or cost and this may affect the cash in-flow in later years.
- v) Taxes will be lower in the early years as a result of higher depreciation allowances due to the diminishing balance system, where the diminishing balance system is used.

Accurate information may not always be available for all these aspects, and no system of appraising results can outweigh inadequate estimating. Since investment decisions may affect operating results for a long period, information on the expected results of a new project should be as sound as possible.

One method of measuring the return is to relate the average annual profit over the life of the project to the average investment. In this sense the varying income or cash in-flow is taken into account in appraising the results, but such a system of averaging ignores the time dimension of the cash flow. To take an exaggerated example, \$1,000,000 in one year's time at 10% interest is worth \$909,000 to-day, but \$1,000,000 in 20 years' time is worth only \$149,000 to-day. It is, therefore, fundamental to investment appraisal that both the amount and the timing of the cash flow be fully reflected in the assessment. This will be further amplified in comparing the system with other methods.

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Choice of Alternatives and Real Costs

It is rare that there is only one way of carrying out a major project. Normally, for example, there are different plant locations, plant sizes, different types of equipment, choices in the market supplied and in price structure. Furthermore the pattern of growth, including the timing and location of future expansions will have to be taken into account. This requires first a determination that the project is worthwhile and secondly that the course of action from the range of alternatives is selected which will lead to optimum results. This can be achieved by selecting a reasonable course of action and determining the rate of return on investment by the discounted cash flow method. Then one of the alternatives is reviewed and the difference in cash flow from the original course of action is determined. The rate of return on this difference in cash-flows is calculated and if it equals the original return or is above a certain level then the alternative will lead to improved results otherwise it is discarded. The various alternatives are then successively examined and either incorporated into the project or abandoned. In this way, the plan which will lead to optimum results will be selected.

Care is also needed in deciding which costs should be taken into account. For example, the book value or depreciated value of existing assets can have no bearing on decisions for the future. As Stanley Jevons has said, "bygones are forever bygones". Existing assets are valued in terms of their ability to generate profit in the future. Moreover, in considering alternatives only incremental costs should normally be included — that is the difference between the level of costs after carrying out the alternative and the level before it is carried out. These costs are not necessarily based on historical information; they may be simply a comparison of the cost of carrying out an alternative with that if it is not carried out. These costs are known to economists as "displacement" or "opportunity" costs. For example, where an existing warehouse is being demolished, the choice in the future may be between building a new warehouse or renting one.

Types of Problem the Method is Useful in Solving

The discounted cash-flow method can be used for a wide range of problems. As already discussed it can be used for selecting from a large number of alternatives in considering a new plant or plant expansion. It can also be linked with probability factors in assessing results. Also it has been used with minor modifications in problems of equipment replacement. In this regard, one of the major factors in the more rapid increase in productivity in the United States compared with Britain undoubtedly has been the willingness to scrap existing equipment before its useful life has ended, in favour of newer processes with lower combined annual capital and operating costs. The method can also be used for comparisons of rental, lease-back or ownership.

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In essence the method summarizes the valuation of a project in terms of one measurement of return on investment. It can, therefore, be used for the ranking of the desirability of a number of new but different projects which are competing for company funds. The rate of return is also calculated in a similar way to the rate of interest at which funds can be borrowed and, therefore, provides an immediate measure of attractiveness in terms of the cost of capital.

Method of Computing the Rate of Return on Investment

The mechanics of computing the rate of return on investment by the "discounted cash flow" method are as follows:—

- (i) Prepare a time table of cash out-flows and cash in-flows indicating whether the cash flows occur at a point in the time or are incurred over a period.
- (ii) Determine the approximate rate of return for the project — short-cut methods are available for this — and multiply the cash flow by present value factors at this rate of return for the year in question.
- (iii) By trial and error find the rate of interest at which the sum of the present values of the cash flow equal zero.

Although published tables of interest rates are not available for rates over 12%, a set of tables has been developed by the Atlantic Refining Company. These tables were developed by the routine application of a mathematical formula. Personnel wholly untrained in the method of calculating the return can master the technique in less than an hour. Short-cut graphical methods using nomograms can also be developed.

Limitations of Other Methods

Pay-Out Period

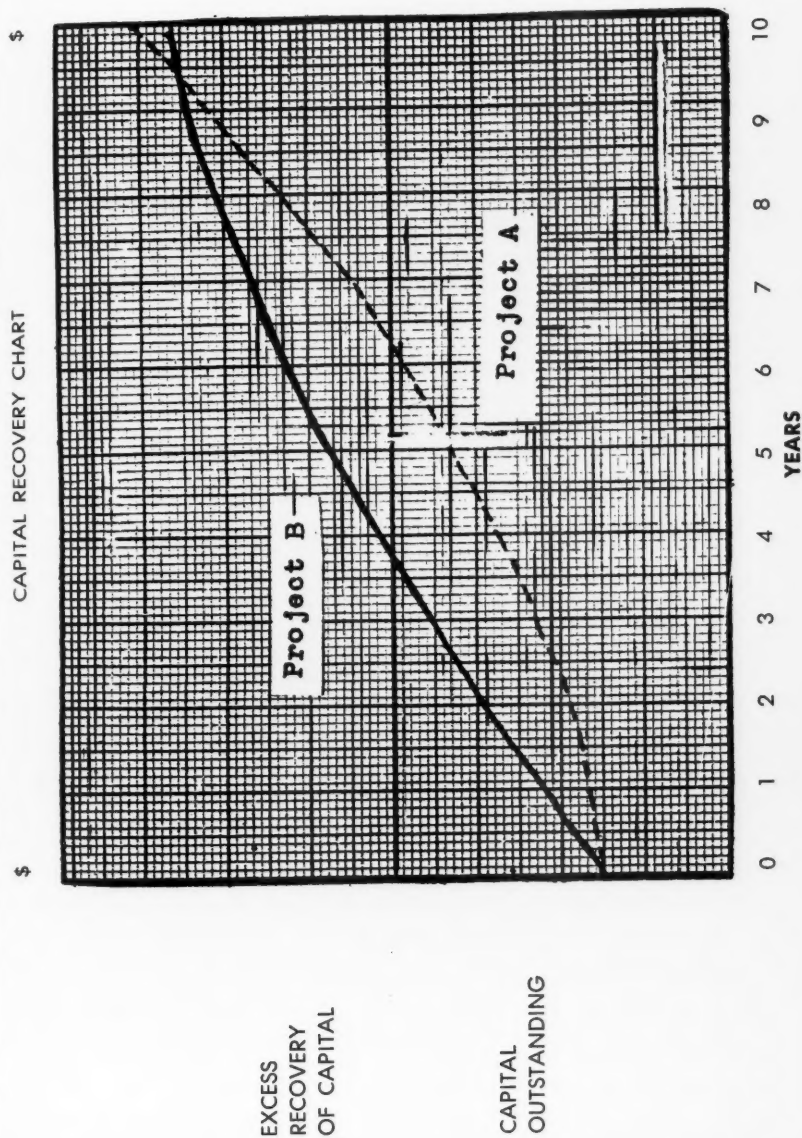
The pay-out period is the number of years that it will take to recover the original outlay. It is, therefore, a measure of cash-flow and also places emphasis on the importance of earnings in early years. However, since it only provides an indication of the time-span to recover the original outlay it gives no indication of the future earnings and therefore, ignores the fundamental reason for the project, the measurement of the excess recovery of capital. In essence pay-out period is a measure of risk.

Capital Recovery Chart

The defect of the pay-out period is partly overcome by capital recovery charts which show the cash flow over the life of a project and, therefore, indicate the excess amount recovered over the original outlay. However, concentration on the amount recovered can lead to wrong decisions if no cognizance is taken of the time dimension of the cash flow. For example, the chart (Fig. 1) indicates that project A is more

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FIG. 1



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attractive than project B since more dollars will be recovered in ten years. This is not true if measured in terms of return on investment as described, since the higher earnings in the early years in project B would more than compensate for the higher recovery in project A in later years. The return on project A is only 13.0% compared with 17.6% for project B. (The method of computing these returns is shown in the Appendix).

It will also be noticed that, although the importance of the time factor may be recognized and taken into account in the appraisal of the two alternatives, mere inspection of the chart cannot guarantee a correct interpretation of the results.

The discounted cash-flow method is however directly related to a capital recovery chart, since it places the information in the chart on a common time basis. The two methods are complementary and may supplement each other in the presentation of results to management. The discounted cash-flow summarizes the results in one figure of relative attractiveness and the capital recovery chart shows both the time required to recover the original capital and also the time pattern of future income.

Return on Investment (Conventional Methods)

There are several variants of calculating return on investment, but in general they relate net profit to investment. In this sense, after providing for the recovery of capital, they relate the excess earnings to the stockholders' investment in money. The main disadvantages of these methods where earnings vary considerably over the life of a project is that the time shape of the earnings is not correctly evaluated. Averaging the return will not achieve this, since it would give equal weight to a project where earnings are high in the early years compared with one where earnings were high in the late years. Yet high earnings in the early years are more valuable because they can be used for other profitable ventures or used to pay dividends sooner than distant earnings.

Summary

Much discussion has occurred in the past on the treatment of interest in accounting problems. This in itself was a recognition of the importance of the time factor in managerial decisions. In addition, there has been uncertainty on the treatment of costs in presenting data for the appraisal of investment projects. It is suggested that these are overcome in "the method of discounting cash flow" in calculating the return on investment. It provides a synthesis of economic and accounting knowledge for the measurement of the effectiveness of investment outlays. Definite advantages are evident over other methods by correct evaluation of time shape of future earnings, by confining analysis to

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cash-flows, by concentration on the economic life of assets, and by providing a flexible system which will not only reflect all the factors which affect a decision, but also provide a simple means of evaluating alternatives. The method is simple in concept and computation is easily mastered by relatively junior employees. It provides an effective means of viewing the results for a single project over its economic life compared with the usual accounting treatment which views the results of all decisions affecting total operations at a single point in time. It is in no way a replacement for sound judgment nor is it a palliative for poor estimates of future results, but by providing a scientific method of evaluating these results, it has a useful part to play in contributing to wise decisions on investment outlays.

APPENDIX

COMPARISON OF RETURN ON INVESTMENT CALCULATED BY "DISCOUNTED CASH FLOW" METHOD WITH RETURN ON BOOK VALUE FOR DATA SHOWN IN CAPITAL RECOVERY CHART

I. Return based on Discounted Cash Flow Method

Year	Cash Flow	PROJECT "A"			
		16%		12%	
		Present Value Factor	Present Value \$'000	Present Value Factor	Present Value \$'000
-1-0	(500)	1.0844	(542.2)	1.0625	(531.2)
0-1	40	0.9241	37.0	0.9423	37.7
1-2	40	0.7875	31.5	0.8358	33.4
2-3	80	0.6710	53.7	0.7413	59.3
3-4	100	0.5718	57.1	0.6574	65.7
4-5	100	0.4873	48.7	0.5831	58.3
5-6	120	0.4152	49.8	0.5172	62.1
6-7	120	0.3538	42.5	0.4588	55.1
7-8	160	0.3015	48.2	0.4069	65.1
8-9	180	0.2569	46.2	0.3609	65.0
9-10	180	0.2189	39.4	0.3201	57.6
	620		(88.1)		28.1

$$\begin{aligned} \text{Interpolating between 12\% and 16\%} \\ \text{the return} &= 12 + \frac{28.1}{28.1 + 88.1} \times 4 \\ &= 13.0\% \end{aligned}$$

Year	Cash Flow	PROJECT "B"			
		20%		16%	
		Present Value Factor	Present Value \$'000	Present Value Factor	Present Value \$'000
-1-0	(500)	1.1070	(553.5)	1.0844	(542.2)
0-1	140	0.9063	126.9	0.9241	129.4
1-2	140	0.7421	103.9	0.7875	110.2
2-3	130	0.6075	79.0	0.6710	87.2
3-4	120	0.4974	59.7	0.5718	68.6
4-5	110	0.4072	44.8	0.4873	53.6
5-6	100	0.3334	33.3	0.4152	41.5
6-7	90	0.2730	24.6	0.3538	31.8

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7-8	80	0.2235	17.9	0.3015	24.1
8-9	60	0.1830	11.0	0.2569	15.4
9-10	50	0.1498	7.5	0.2189	10.9
	<u>520</u>		<u>(44.9)</u>		<u>30.5</u>

$$\begin{aligned} \text{Interpolating between 16\% and 20\%} \\ \text{the return} &= 16 + \frac{30.5}{30.5 + 44.9} \times 4 \\ &= 17.6\% \end{aligned}$$

II. Return based on Book Value

PROJECT "A" (Book Value \$500,000)				
Year	Cash in-Flow	Depreciation	Net	Return on
	\$'000	at 10%	Profit	Book Value
		\$'000	\$'000	%
0-1	40	50	(10)	(2)
1-2	40	50	(10)	(2)
2-3	80	50	30	6
3-4	100	50	50	10
4-5	100	50	50	10
5-6	120	50	70	14
6-7	120	50	70	14
7-8	160	50	110	22
8-9	180	50	130	26
9-10	180	50	130	26
				<u>124</u>

$$\begin{aligned} \text{Average Return on Book Value} \\ &= \frac{124}{10} = 12.4\% \end{aligned}$$

PROJECT "B" (Book Value \$500,000)				
Year	Cash in-Flow	Depreciation	Net	Return on
	\$'000	at 10%	Profit	Book Value
		\$'000	\$'000	%
0-1	140	50	90	18
1-2	140	50	90	18
2-3	130	50	80	16
3-4	120	50	70	14
4-5	110	50	60	12
5-6	100	50	50	10
6-7	90	50	40	8
7-8	80	50	30	6
8-9	60	50	10	2
9-10	50	50	—	—
				<u>104</u>

$$\begin{aligned} \text{Average Return on Book Value} \\ &= \frac{104}{10} = 10.4\% \end{aligned}$$

III. SUMMARY

	Return on Investment		Excess Capital Recovered
	Discounted Cash-Flow	Book Value	
	%	%	\$'000
PROJECT "A"	13.0	12.4	620
PROJECT "B"	17.6	10.4	520

The "discounted cash flow" method indicates that if a choice had to be made between the two alternatives, Project "B" would be selected. However, the same decision would not be made if the average return on the book value of investment or a capital recovery chart were used.

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FOR FURTHER READING

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COST AND MANAGEMENT

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The Organization Analysis* . . .

By H. J. NEUFELD,
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An organization analysis can on the whole be broken down into six basic steps. The author outlines these and cites some of the advantages derived by his company from applying the method of analysis described in the following article.

WHAT IS an organization analysis? It is the systematic examination of all factors having a bearing on the organization structure and the careful planning of this structure through the application of sound organization principles. Mr. Coleman L. Maze in his book "Office Management" said — "No organization whether it be for the company as a whole or for one department or section of the company can be expected to be self-developing". It is my purpose to outline a practical and successful method of conducting an organization study.

The method I will describe has been employed in our Company for several years. We have been rewarded with increased efficiency, greater co-operation, better service, improved job satisfaction plus a substantial reduction in operating costs.

I shall not attempt to lay claim to any originality, except perhaps in the sequence of steps and the placing of emphasis, which can be subject to argument. What we do has been discussed hundreds of times by many people. You can read about it in text books and in articles. If I have any quarrel with what has been said it is because too often either the formal organization or the human factor is emphasized as being the sole determining factor. Neither premise is correct because they are both very important, although the human factor is more difficult to deal with simply because it is human. As such, it requires more attention. The acid test lies in the achievement of a proper balance of all factors. We must work with what we have or what we can get. Anything beyond this is Utopian.

Before proceeding to the steps in the analysis, I would like to emphasize two considerations. First, the importance cannot be over-emphasized of setting the stage for the analysis by properly informing all people concerned. An organization may not be self-developing but it certainly cannot be planned without the full co-operation of the individuals responsible for it. The reason for the analysis and what it is expected to accomplish must be understood and appreciated by everyone coming under the influence of the study. The broad outline should be explained by superiors. The detail is explained later by the analyst.

The second consideration is that the analyst be aware of the several factors that may influence the organization. As already mentioned, we

*Presented at the National Office Management Association Seminar sponsored by the Minneapolis-St. Paul Chapter, November 15-16, 1955.

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quickly think of the formal organization and the human factor. But, quite apart from these very important points, there are many other factors that to a greater or lesser degree may affect the organization. Management philosophy will have a bearing on the type of organization we can have. The arbitrary manner in which functions may be distributed — the system or systems in effect — type of equipment used or the degree of mechanization employed — physical facilities such as type of space available — size of the operation — the unequal growth of the several sub-units of the organization — all these and possibly many more factors have to be considered.

With the foregoing as background, let us now turn to the main steps we employ in our organization analysis.

Assemble the Facts

The purpose of assembling current information is to display in factual form the situation as it exists. There are three methods of gathering information.

1. Assemble all available written or visual material.
2. Obtain the information personally through interviews of every person in the organization.
3. Obtain the information by means of formal questionnaires.

We employ only the first two methods although we are inclined to be a little skeptical of the written material even in those cases where formal manuals and job write-ups are maintained. People have a habit of working out their own solutions regardless of written instructions. The human factor again. We regard the personal interview as the key to obtaining accurate up-to-date information. It also gives the analyst an opportunity to explain in detail the purpose of the analysis or study and obtain the individuals' co-operation. The existence of an informal organization is also readily detected through the interviews.

Assembling the facts can be a tedious task and it may be difficult to maintain enthusiasm at this point, yet it must be undertaken with extreme care to make sure that all information essential to a proper analysis of the organization is assembled. The information we seek is as follows:

1. A complete description of the work for which the individuals are responsible.
2. From where do they receive their work and where is it sent.
3. To whom are they responsible and who is responsible to them.
4. Comments and suggestions.
5. The degree of individual productivity.
6. The general tone or morale of the group.

As far as is possible we then record the information as indicated in the first three items in the form of charts — an organization chart, a job distribution chart and multiple-desk flow process charts. The latter is

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one of our most effective tools for analysis purposes since it provides us with a complete picture of the job titles, the work assigned to these and the flow of work between the desks.

Determine the Purpose

I am often amazed to find that when we consider the purpose of an operation, we are frequently dealing with a secondary purpose and not the primary purpose. A secondary purpose is only a means to an end while the primary purpose is the end itself. As the office staff grows and we start to compartmentalize, the primary purpose of an operation gradually recedes into the background. On inquiry in departments as to the purpose of their work, we may receive answers such as "to clear vouchers", "to check statements", "to prepare bills", "to deal with complaints", "to post", "to maintain records", and so on. Even senior personnel in such cases would be hard put to tell us what finally the primary purpose of each of these tasks is. Eventually a secondary purpose ceases to be a means to an end and becomes an end in itself. When that happens, it assumes an importance that is out of all proportion to what it actually accomplishes in the total operation and may develop into a malignant growth. This growth will in turn shape the development of other operations with which it comes into contact.

Why is it so important to determine the purpose? Because we must never lose sight of what the *total* operation is to accomplish, and whether any or all of the auxiliary operations serve that purpose. It is only after we have clearly established the basic purpose that we can search for the simplest and most direct way to achieve it.

Classify the Functions

As there are primary and secondary purposes so are there main functions and supporting functions. An excellent method of classifying these is the so-called "functional organization chart" or perhaps what may more correctly be termed the "functional spread sheet". On this spread sheet we state the primary purpose and set out the main and supporting functions with due regard to their inter-relationships. The value of the functional spread sheet is that it facilitates the determining and clarifying of functions which are essential to the achievement of the purpose.

It should be borne in mind at this point that the related functions in areas not under study be brought into play to the extent that either one or the other may be affected.

Evaluate the Findings

All factors having a bearing on the organization must now be brought together and weighed. The aim is to achieve a well balanced, effective and economical organization. At this stage we arrive at the crux of the analysis. The fact finding, the determining of the purpose and the classification and distribution of functions will in themselves

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quite automatically produce benefits, but the *degree* of improvement to be brought about by any suggested revision will depend on the skill with which all the factors are weighed. The human factor is one of the most important considerations if we are to achieve maximum success. But more about this presently. Since the human factor can have an overriding impact, we like to bring it into play after all other factors have been considered.

We first undertake some systems and methods work on a broad basis. What systems changes are indicated as a result of the classification and distribution of functions? Are there any duplications and can these be eliminated? Can other activities be combined? Can mechanization be employed? Does the space available lend itself to the type of organization we can visualize? What about the flow of work? All these will set the stage for later procedures analysis. We believe that in order to achieve the best results, systems and organization are inseparable. Each will shape the other.

And now the human factor. An organization has no true meaning or significance until translated into the kind of human effort required to accomplish a predetermined purpose. If we do not carefully evaluate the effect of an organization in the light of the effort that will be required by the people, they will attempt, without regard to all the factors, to make things work. They will introduce informal organizations between individuals and duplicate files and records so that the work can get out. No matter how good these efforts may be, the effect on costs can be serious and damaging areas of conflict between individuals and departments can be created. The organization should be designed to foster co-operation by properly naming the purposes and assigning the functions. The interrelationship of persons and groups of persons exerts a constant major influence on the entire organization and the effect can vary from being economical and constructive to being costly and even destructive. Apart from the points mentioned there is the practical consideration of most suitably employing present personnel. An illustration is the large insurance company that made a very complete survey to determine the desirability of acquiring electronic data processing equipment. They concluded that this equipment could be put to economical use in their company but then decided to postpone the venture for the time being because they had many older and well regarded employees who could not be fitted into the new organization. On the other hand we have many examples of situations where it was possible to retrain personnel or employ them in more suitable work, thereby increasing their usefulness and productivity.

Determine Work Arrangements

Whether the determination of work arrangements precedes or follows the evaluation will depend on the circumstances. Generally speaking, we like to leave this until after the initial major evaluation.

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The degree of specialization inherent in a function will influence the type of work arrangement desirable. But there may be other problems to be considered. Special territorial situations or conditions and the size of the clerical work force doing closely related work may dictate breaking the total work force into smaller units. This can be accomplished in several ways. There are three major patterns for dividing the flow of work:

1. *Serial or Assembly Line* (consecutive handling). The work moves by and large through a single channel with each case progressing step by step through various work stations.
2. *Parallel or Unit* (concurrent handling). The flow of work is divided in bulk among a number of workers, or work teams, each completing all or nearly all the steps for the cases assigned to it.
3. *Unit-Assembly* (simultaneous handling). Different workers perform different work steps upon the same work item at the same time.

As to which of these work flow patterns should be employed will depend on the following factors:

- a) Relationship of activities
- b) Degree of specialization required
- c) Possible bottlenecks within the work flow
- d) Speed of service required
- e) Special considerations
- f) Available labour supply

As a practical solution, we may elect to employ a combination of the three flow patterns referred to. The larger groups may be first set up on a parallel or unit basis, say by territory, and within the units use the assembly line method. Where the work previously had been broken down into several simple uninteresting steps, we have found the unit method to be a practical help in creating greater interest and satisfaction through job enlargement. However, regardless of the pattern adopted, it should be selected with due regard to the six factors listed.

Individual responsibilities are then assigned through the use of a job distribution chart or the multiple desk flow process chart. However, the latter chart does not lend itself as well to the determination of individual work loads. If substantial changes have been made in job content, it is obviously essential to obtain good estimates of the time involved in the new duties. We cannot always determine this accurately and for this reason adjustments are frequently necessary during and after the adoption of a new organization and system.

Prepare the Organization Chart

The organization chart is an outward manifestation in visual form intended to convey to the viewer the people in the organization, their authority and their relationships. It has obvious limitations in that it cannot portray personal relationships so important in any human en-

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deavour nor can its beauty or the care with which it has been prepared, with due regard to the principles of good organization, guarantee that it is an effective organization. It is essential that these limitations be borne in mind to make sure that we will always regard it as only one of the tools of management, otherwise it may become our master. We will also admit that it is quite possible to have an exceedingly effective organization without ever having attempted to formalize it on a piece of paper.

Does this mean then that the maintenance of organization charts is of little value? Quite the contrary. The reason for emphasizing the limitations is merely to avoid the danger of regarding it as the sum total of the organization. The very act of carefully preparing an organization chart will quickly bring to light undesirable features within the organizational structure. Certainly, if your organization has obvious shortcomings, it will stick out in the chart like the proverbial sore thumb.

It is not my purpose in this paper to discuss the principles of good organization as such. But before finally charting a proposed organization the analyst should ask these questions:

1. Are the purpose and the objectives clear and are they understood?
2. Are the principal and supporting functions clearly understood and have they been specifically assigned with proper regard to their relationships and without overlapping?
3. Is the delegation of responsibilities and authority clear and understood from the highest to the lowest levels?
4. Has sufficient consideration been given to the limitations of supervisory control or span of control?
5. Have the types of authority been clearly defined; that is the Line Authority, the Functional Authority, and the Staff Authority?
6. Finally, has proper weight been given to the human factor?

We can now proceed with the preparation of the organization chart. Avoid trying to show too much on one chart, otherwise it will be confusing. It is better to prepare several charts including one which shows only the main functions and those responsible for them. An organization chart to be used as a tool must be clear and as simple as possible without sacrificing an accurate picture within the limitations of such a chart.

The maintenance of an organization chart should be fundamental. Its need, both for the entire company and also within divisions and departments, should be accepted as an established fact. Benefits we may expect from this practice are:

1. Clarification of responsibilities and relationships
2. Clarification of intra-company references and contacts from the outside business world

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3. The highlighting of areas where greater depth of management is required
4. Assistance in regulating informal organization if the organization is objectively and imaginatively conceived
5. A guide to future planning
6. Assistance in improving communication and co-ordination within the company.

Putting the Organization Plan to Work

After the basic steps in the organization analysis have been completed, the best possible solutions determined, and the recommended organization chart prepared, there follow three distinct steps.

1. Gaining acceptance for the recommendations
2. Implementing the changes
3. The follow-up

The extent to which efforts may have to be expended to gain acceptance for the recommended changes will depend on a variety of situations, but that there must be acceptance is basic. We keep supervisory personnel in the picture throughout the organization study wherever possible, so that solutions may be worked out jointly. In the implementing of the changes timing and scheduling must be worked out carefully to avoid an interruption in the normal work output. Extensive retraining may be necessary. During the follow-up it may be necessary to make some adjustments to the new organization due to unforeseen situations or because certain facets of it could not be too closely predetermined. It is not within the scope of this paper to expand on these three steps beyond what has been said.

Some Tangible Results

I mentioned earlier that our programme of organization analysis had proven most rewarding. To demonstrate this I would like to give two examples. In 1950 we undertook an analysis of our Mortgage Investment Division. The clerical staff in this division numbered 43 plus an additional 16 clerks in the Investment Accounting Department, who, organizationally, belonged to another division. The work of these two groups was closely related but there was not the unity of feeling that might normally be expected in a group having a common interest. Flow of work was cumbersome despite the relatively close physical proximity. Many duplications developed as a result. After a thorough analysis it was decided to combine the two groups under unified leadership. This permitted substantial systems changes and the reassignments of functions. Here are the results! The total clerical force now numbers 38, a reduction of 36% despite an increase in assets of over 100%. Here again, I would like to state our belief that organization and systems are inseparable. Mr. D. Y. Cole of the Northrop Aircraft, Inc. stated in the "Office Executive" of March 1952 — "In the evolution of a systems

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function, the organizational structure becomes the formulation of all other systems activity; if that structure is faulty, the progress of the systems programme will be unnecessarily difficult".

The second example is the reorganization and work reassignment in our Branch Offices. The serial pattern was formerly employed. We had three main problems — bottlenecks in the flow of work, too many uninteresting jobs, and the use of the basic records by too many clerks, resulting in a large number of records being off file. This in turn caused a general slow-down. We adopted the parallel or unit pattern to solve these particular problems. While a simplification programme was undertaken at the same time, it was the reorganization that netted the greatest results. In addition to solving the problems, we were able to reduce the staff by as many as eleven clerks in the largest branches. The reductions in staff ranged from 10% to 30%. These two examples are illustrative of what can be achieved through organization analysis.

Summary

In this outline of an organization analysis, I have referred to six basic steps:

- The assembling of facts
- The determination of the purpose
- The classification of functions
- The evaluation of the findings
- The determination of work arrangements
- The preparation of the organization chart

The actual study does not always break itself down into these clearly defined steps nor is it always done in that order. This is particularly true if the organization unit studied is small and at one of the lower levels. But, and this is important, all elements of these steps must be present if we wish to achieve the maximum results from the analysis.

We must also remember this. The organization analysis programme should be carried out on a continuous basis. It is surprising how fast organization structures and systems will age. The rapid growth of a business and the ever increasing complexities of modern business accelerate this process of aging. Consequently, the organization structure requires frequent adjustment. The purpose of the organization analysis is to achieve a compact striking force directed toward the immediate attainment of the objectives. The attainment of that goal demands our constant attention.

FOR FURTHER READING

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- HOW TO REVISE YOUR ORGANIZATION CHARTS, by L. M. Slote, Management Methods, May 1955.

Business Forecasting* . . .

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In the following article the author outlines a complete approach to the establishment of a planned sales programme, from the initial marketing research, through analysis and market determination to production planning, application of controls and advertising, emphasizing the myriad factors that affect each, and the responsible role of management in allowing for these factors in the master plan.

THE ULTIMATE aim of business is to give a service, whether in the form of equipment needed by the community, a means of transportation, a food service, professional advice, or some other such need.

In order to acquire the necessities of existence, not only individuals but industry must share in the wealth derived from converting nature's bounty into usable and consumable products. We, as individuals, have come to look for some measure of wealth over the true measure of our direct worth, which addition can be invested in education, culture and relaxation. Industry needs some return above the basic cost of production and services for re-investment, research, improvement of plant and facilities and expansion towards further improving products and making more products available to more individuals who require them.

Business forecasting then is concerned penultimately with profits. Not profits in volume, out of proportion to necessary return on business investment and development, but planned profits. Out of these profits shareholders will expect some fair dividend and a reasonable amount must be set aside to provide for future capital expenditure.

In projecting our schemes into the future, we must therefore ensure that when the time comes to implement them, by co-ordinating the effort of our business team, due provision is made for profit. But how to project our schemes into the future successfully is of prime importance to the management group entrusted with the welfare of the enterprise and its employees.

Market Research

In relatively recent years industry and commerce and to a lesser degree governments have undertaken research on a scientific basis with a view to establishing where markets exist for products and services, in what volume, at what price, in what form and at what time.

There are several approaches to this research but if it is to be done well there are no shortcuts. The degree of investigation and accuracy of results required will depend on

1. The trend in past sales figures, by products influencing
2. The number of market factors it is considered necessary to investigate

*An address delivered to the Hamilton Chapter of the Society of Industrial and Cost Accountants on February 16, 1956.

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3. The type of customer — wholesale, jobber or consumer
4. The method of selling
5. Available funds
6. The area where products are sold
7. The type of product.

Sources of Information and Influences

In getting our study data together let us not forget factors likely to influence our future sales such as Interest Rates, Credit Restrictions, International Tariffs, Taxation and Sales and Excise Taxes. Now the permanency or fixedness of these currency problems is difficult to assess. Unless we can assuredly discern some movement of the rates or restrictions we can do no more than assume a "no change" condition in the period for which we are forecasting.

Then too we must consider climatic conditions, geographic location and seasonal influences like holiday evacuations or an influx of visitors. In large industrial areas we could even keep an eye on labour figures vis-a-vis lay-offs, union agreements and possible strikes.

Information regarding the income earned by each strata of the community and the sums spent on our products can be obtained from such sources as the Dominion Bureau of Statistics, Trade Journals and Industrial Associations, Board of Trade and Chamber of Commerce centres, as well as from local provincial government offices.

Population by sex, age and families should not be overlooked. Available outlets presently used by competitors, relative merits of competitors' products and, if possible, their sales volumes should be studied.

Thus we arrive at the total market and the share of it we are getting; the potential market and what effort is necessary to break into it; also our competitor's market and how we might make inroads into that most coveted field.

We can go further by engaging in domestic sampling. This is an intricate business of a specialist nature and its implementation and the interpretation of accumulated data is best left to those specializing in "public preference" research.

Operations Research

This is no new science but rather the application of the Laws of Statistics and Averages to those aspects of business which contain problems involving economic conditions where exact cause and effect relationships are not easily established. These are known as "probability relationships". Such probabilities abound in the distribution function. What doubles a company's sales? Expense on TV sponsored programs? Not necessarily. What makes for economical materials inspection and effective quality control? Regularly checking the first twelve and last six products received each day? Certainly not.

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Doubling sales may depend on many complexities and many not clearly definable factors. But we have to have some indication of where we are going and what to expect.

Intuition and guesstimates are only right about 50% of the time. The application of mathematical formulae as related to probability is a tool which can no longer be overlooked. If these formulae do not give you the right answer every time, at least you know how your answer was arrived at and your decisions can be based on scientific reasoning rather than "witchcraft".

Analysis of Research Data

All these data must now be broken down into a plan by calendar periods and areas to establish what our sales volume should be throughout the planned-for future term. Here is the base for perhaps the greater part of our forecasting and without that base management will be guessing not only at sales volume but at every individual employee activity and the usage of assets in the enterprise. Don't misconstrue me; because of human inconsistency market forecasting is still an inaccurate science even when economics and statistics are introduced. But to make no attempt at planning is suicidal.

From this base then sales volume must be converted into product quantity, quantity into component parts, component parts into raw material content, scrap, rejects and thence into unworked raw material. By reference to our sales plan and the manufacturing time cycle, we can then establish when production must commence in order to have the products sold in the right place at the right time, allowing for transportation and local delivery.

We are in a position now to establish when we must order raw materials and in what quantities to satisfy the production for sales, allowing in our purchasing plan for lead time, shortages and other relative factors. This incidentally should help us to operate on an economic minimum inventory and establish low contract prices.

So far we have planned for sales, time, materials and purchasing but not for labour, manufacturing capacity or cost.

At this point we enter the complex field of Production Planning and Control which can only be skirted briefly here.

Production Planning

I am satisfied that the days of haphazard planning, of guessing, muddling and hoping with faith in some ethereal intuition, are over. We are learning that we can measure human activity and by study of work effort contribute to greater employee efficiency. By simplifying methods, deskilling jobs and improving supervision, we can increase output and by establishing standards for work effort, machine output, material and space usage, we can measure achievement against those standards.

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Thus we no longer have to wait until the manufacture of a product is in operation before knowing the production cost; for a well organized plant will have necessary standard measurement of time, space and material available for the costing of all products.

Furthermore, having such standards available, to calculate capacity of the labour force or machinery or plant is a relatively simple problem, even departmentally. Thus we can look at our products A to D, determine the necessary and possible departmental production labour and/or machine loading and tell the sales director the extent to which he can be accommodated. So your sales planner must now readjust his ideas in considering manufacturing costs, taking into account large volume low profit margin items, etc., e.g. 5,000 of C may, because of lack of capacity with associated bottlenecks, cause the exclusion of 5,000 of D which could be a most profitable item. Hence the problem becomes one of policy.

Sales Profitability

Now after a little trial and error and considerable calculation we can probably arrive at economic production volume levels for the products the sales division requires. The most desirable "mixes" from the viewpoints of production efficiency can be determined fairly easily by the use of "standard" breakeven charts. But we must also look at our selling expense to ensure that the profits planned for up to the manufactured stage — are not whittled away by inefficient distribution and selling methods.

We must ask ourselves — as sales managers — how much of our time can be profitably spent on selling each type of product, e.g. are we going to spend four hours selling a retailer \$5,000 worth of goods "A" whereon the net profit is 10%, say \$500, or are we going to spend twelve hours selling a contractor \$500,000 worth of product "B" whereon the profit is 2%, say \$10,000.

In case A our time in terms of sales is worth \$125 per hour.

In case B our time in terms of sales is worth \$833 per hour.

Again, a large number of small volume customer accounts can prove a most uneconomical selling proposition; but sales can be measured, selling expenses calculated and controlled and we can plan such a mix of merchandise that not only do we obtain a high plant efficiency but a profitable selling operation.

There are however one or two factors that might necessitate some further adjustment in the balancing of our profits forecasting.

They are:

1. The need of a lead line with an accepted proprietary reputation.
2. The limitations on pricing where comparable competitors' products are offered on the same market.
3. The introduction of new lines with a possible uncertain future.

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4. Sudden unforeseeable demands for particular products.

In the case of a lead line, it may be necessary to budget for a small profit or even a loss on large volumes.

In the case of pricing in line with the market, your profit will not be planned other than by volume adjustment and selling emphasis to maintain volume.

The uncertain future of new lines should be allowed for by a conservative estimate of profits until experience is obtained.

The sudden demand for particular products has probably put more small men out of business than shortage of working capital. The urge to drop everything and satisfy demand, the attraction of large volume and the hypnosis appeal of the "first million" with elimination of diversification can so easily convert a reasonable plan into a production nightmare that every element of control is lost and the precipice of disaster is soon overshot.

Incentives and Advertising

There are, of course, other means of ensuring the success of our business forecasting. In the personnel field, we can select the right man for the job, train and educate our employees, in particular the supervisory staff, and we can encourage their interest in the enterprise.

In the production field, we can, having set our standards, consider incentives; we can improve working conditions; we can simplify the job and lighten the work; we can mechanize and perhaps introduce automation.

In the sales field, we can determine our plan and can train the selling staff on the technical and peculiar aspects of our products; we can plan their time and apply them to the work for which they are best suited; we can introduce incentives, advertise, display, sponsor TV and radio shows or even work out premium coupon "swindles". Advertising of course should be planned for (1) maintaining volume, (2) promoting new lines, (3) as a selling assist.

In the administrative field, we can establish proper accounting and statistical analyses and controls sufficient to help management at executive level make the correct decisions. We can train "managers" in management and organization principles. Particularly under organization can we improve our span of control, our concept of staff and line operations and the definitions of the Duty, Authority and Responsibility of employees. We can free members of the executive group from detail work, and permit them to think and plan and direct.

Controls

We cannot however, have direction without control. We are not concerned in this paper with specific controls, such as sales budget control, budgetary control, standard and variance costing, inventory control, accident prevention, material, labour and machine utilization,

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etc., but we should all be aware of them; we should be looking always for the loopholes through which our best laid plans too often disappear.

We in our own field of operations must remember that one of the principles of sound organization requires that all members of the enterprise work towards one definite objective and the management group is responsible for co-ordinating all human effort to obtain that objective.

Principles

In business forecasting then, we must first aim to get our principles established. Indirectly we have touched on several fundamentals of a sound organization. The fundamentals are:

The Objective: Every organization must have a purpose.

Specialization: As far as possible every member of a group should be directed to a single function.

Co-ordination: The purpose of organizing is to facilitate co-ordination; to obtain unity of effort.

Authority: A clear line of authority must exist. There must be a supreme authority.

Responsibility: The responsibility of the superior for the acts of his subordinate is absolute.

Definition: The duties, authority, responsibility and relationships of every position should be defined in writing.

Correspondence: The responsibility and authority of every position should correspond.

Span of Control: In general no one person should supervise the work of more than five persons *whose work interlocks*.

Balance: The units of every organization should be kept in balance.

Continuity: Re-organization is a continuous process.

Think of these principles when doing your job of business forecasting. Every one of them is worthy of a paper in itself.

Now we may, on the surface, appear to have strayed some distance from our subject of business forecasting but since to cover our subject we had to work from market research through sales, production, personnel and planning to calculated profits and a service then, you see, we had in effect to consider our whole operation.

You cannot isolate any one aspect of an enterprise and plan for its sole development or retardation without considering also every other aspect of that enterprise and all along the line all the time you must be making decisions. Make sure that those decisions are founded on proven and sound principles of Organization. Without them business forecasting will be abortive.

Conclusion

In considering business forecasting, you will appreciate that enough importance cannot be attached to the accuracy of sales forecasts, subsequent planning, the application of controls and continuous investigation and research to ensure that plans are achieved.

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The responsibility of management in this respect is an onerous one — one too often not fully accepted. The acquisition of a managerial title does not permit greater relaxation in a larger swivel chair with feet up on a bigger desk, but rather it should afford a greater mobility and more space wherein to organize more effective co-ordination of effort with those to whom we report, with whom we work and for those for whom we are responsible.

FOR FURTHER READING

BUSINESS FORECASTING, by J. D. Gould, *The Cost Accountant*, Sept. 1955.

BUDGETING AND LONG RANGE FORECASTING, by Thomas Chambers, *Cost and Management*, July-Aug. 1955.

MONTHLY AND ANNUAL FORECASTING, by C. Abel, *N.A.C.A. Bulletin*, June 1955.

PLANNING FOR ACTION, FROM BUSINESS FORECAST TO COMPANY PROGRAMME, by Lewis E. Lloyd, *A.M.A. General Management Series No. 167*.

Student Section . . .

EXAMINATIONS, 1955

FUNDAMENTALS OF COST ACCOUNTING

QUESTION II (15 marks)

The president of your company has asked you to suggest a method of applying manufacturing expense to various production orders.

Throughout the month of March all manufacturing activity was directed to the production of four orders — numbers 1024, 1026, 1031 and 1069. You decide to prepare a schedule for these four orders showing the job manufacturing cost comparatively for Direct Labour Cost, Direct Labour Hours, and Machine Hour bases. The following are cost data with respect to the above production orders:

	Raw Materials	Direct Labour Cost	Direct Labour Hours	Machine Hours
No. 1024	\$2,000	\$6,000	4,000	1,900
No. 1026	3,500	4,000	3,000	1,500
No. 1031	3,000	3,000	1,550	800
No. 1069	1,500	2,000	1,450	300

Accounting data provided by the general accounting department:

Payroll taxes (deducted at source)	\$ 855
Depreciation — machinery	22,000
Municipal taxes	1,000
Depreciation — buildings	12,000

STUDENT SECTION

Direct labour	15,000
Office salaries	1,000
Materials	10,000
Office stationery	500
Fire insurance—buildings	200
Advertising	1,500
Power	2,000
Indirect labour	4,000

REQUIRED:

- Prepare a comparative schedule, showing the cost of production for each order, with the manufacturing expense applied on each of the following bases:
 - Direct Labour Cost
 - Direct Labour Hours
 - Machine Hours
- Which method would you recommend? Give your reasons.

SOLUTION TO QUESTION II

Total Direct Labour cost in dollars	\$15,000
Total Direct Labour hours	10,000
Total Machine Hours	4,500

Accounting Data

Description	Amount	Exclusion	Mfg. Expense
Payroll taxes (deducted at source) ..	\$ 855	\$ 855	\$
Depreciation—machinery ..	22,000		22,000
Municipal taxes	1,000	100	900
Depreciation—buildings	12,000	1,200	10,800
Direct Labour	15,000	15,000	
Office salaries	1,000	1,000	
Materials	10,000	10,000	
Office Stationery	500	500	
Fire Insurance—building	200	20	180
Advertising	1,500	1,500	
Power	2,000		2,000
Indirect Labour	4,000		4,000
Other manufacturing expense	275		275
Heating	1,100	110	990
Indirect materials	3,000		3,000
	<u>\$74,430</u>	<u>\$ 30,285</u>	<u>\$ 44,145</u>

Manufacturing expense— Percentage to direct labour	294%
Manufacturing expense— Per Direct labour hour	\$4.41
Manufacturing expense— Per Machine hour	\$9.81

COST AND MANAGEMENT

Production Order Number	Direct		Mfg. Exp. Applied on			Total Cost on Basis of		
	Material	Labour	Labour Dollar	Labour Hour	Machine Hour	Labour Dollar	Labour Hour	Machine Hour
1024	\$ 2,000	\$ 6,000	\$17658	\$17658	\$18639	\$25658	\$25658	\$26639
1026	3,500	4,000	11772	13243	14715	19272	20743	22215
1031	3,000	3,000	8829	6843	7848	14829	12843	13848
1069	1,500	2,000	5886	6401	2943	9386	9901	6443
	<u>\$10,000</u>	<u>\$15,000</u>	<u>\$44145</u>	<u>\$44145</u>	<u>\$44145</u>	<u>\$69145</u>	<u>\$69145</u>	<u>\$69145</u>

Recommend: Machine Hours if sound clerically OR Labour hours.

